

## CLAIMS

What is claimed is:

- 1 1. A method for automatically partitioning a behavioral description of an  
2 electronic system between hardware and software for optimizing the system,  
3 comprising the steps of:  
4 (a) receiving a behavioral description of the electronic system;  
5 (b) determining an optimal functionality between hardware and software of the  
6 electronic system; and  
7 (c) partitioning implementation of the functionality between the hardware and  
8 software based on the determined optimal functionality.
- 1 2. A method as recited in claim 1, wherein the step of partitioning  
2 implementation of the functionality includes varying at least one parameter  
3 of at least one of the hardware and software.
- 1 3. A method as recited in claim 1, wherein the hardware and software are  
2 formed on a reconfigurable logic device.
- 1 4. A method as recited in claim 1, further comprising the step of outputting at  
2 least one of a description of the required processors, a description of the  
3 machine code to operate the processors, and an identification of the  
4 necessary hardware.
- 1 5. A method as recited in claim 1, wherein the step of determining an optimal  
2 functionality includes generating a plurality of different partitions of the  
3 functionality, estimating a performance of the hardware and software for  
4 each of the different partitions, and selecting one of the different partitions  
5 based on the estimate.

- 1 6. A method as recited in claim 1, further comprising utilizing a genetic  
2 algorithm for estimating the performance of the hardware and software for  
3 each of the different partitions.
- 1 7. A computer program embodied on a computer readable medium for  
2 automatically partitioning a behavioral description of an electronic system  
3 between hardware and software for optimizing the system, comprising:  
4 (a) a code segment that receives a behavioral description of the electronic  
5 system;  
6 (b) a code segment that determines an optimal functionality between hardware  
7 and software of the electronic system; and  
8 (c) a code segment that partitions implementation of the functionality between  
9 the hardware and software based on the determined optimal functionality.
- 1 8. A computer program as recited in claim 7, wherein the code segment that  
2 partitions implementation of the functionality includes a code segment that  
3 varies at least one parameter of at least one of the hardware and software.
- 1 9. A computer program as recited in claim 7, wherein the hardware and  
2 software are formed on a reconfigurable logic device.
- 1 10. A computer program as recited in claim 7, further comprising a code  
2 segment that outputs at least one of a description of required processors, a  
3 description of machine code to operate the processors, and an identification  
4 of necessary hardware.
- 1 11. A computer program as recited in claim 7, wherein the code segment that  
2 determines an optimal functionality includes a code segment that generates a  
3 plurality of different partitions of the functionality, a code segment that  
4 estimates a performance of the hardware and software for each of the

5 different partitions, and a code segment that selects one of the different  
6 partitions based on the estimate.

1 12. A computer program as recited in claim 7, further comprising a code  
2 segment that utilizes a genetic algorithm for estimating the performance of  
3 the hardware and software for each of the different partitions.

1 13. A system for automatically partitioning a behavioral description of an  
2 electronic system between hardware and software for optimizing the system,  
3 comprising:

- 4 (a) logic that receives a behavioral description of the electronic system;  
5 (b) logic that determines an optimal functionality between hardware and  
6 software of the electronic system; and  
7 (c) logic that partitions implementation of the functionality between the  
8 hardware and software based on the determined optimal functionality.

1 14. A system as recited in claim 13, wherein the logic that partitions  
2 implementation of the functionality includes logic that varies at least one  
3 parameter of at least one of the hardware and software.

1 15. A system as recited in claim 13, wherein the hardware and software are  
2 formed on a reconfigurable logic device.

1 16. A system as recited in claim 13, further comprising logic that outputs at least  
2 one of a description of required processors, a description of machine code to  
3 operate the processors, and an identification of necessary hardware.

1 17. A system as recited in claim 13, wherein the code segment that determines  
2 an optimal functionality includes logic that generates a plurality of different  
3 partitions of the functionality, logic that estimates a performance of the

4 hardware and software for each of the different partitions, and logic that  
5 selects one of the different partitions based on the estimate.

1 18. A system as recited in claim 13, further comprising logic that utilizes a  
2 genetic algorithm for estimating the performance of the hardware and  
3 software for each of the different partitions.